TFT Evaluation Kit

User manual

CUSTOMER		
PRODUCT NUMBER	**TFT-K-Kit-001**	
CUSTOMER APPROVAL		**Date**

INTERNAL APPROVALS		
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Date: 04/09/07	Date: 04/09/07	Date: 04/09/07

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1 Introduction

This user manual contains the instructions on setting up and using the Densitron Kyocera TFT evaluation kit.

The evaluation kit contains:

- 1 x Kyocera TCG104VG2AA 10.4” TFT panel
    - Anti glare treatment
    - (640 x R.G.B) x 480 dots
    - COG LCD with side edge type CFL Backlight (2 tubes).
    - Recommended inverter TDK CXA-0308
    - Dimensions: 243 x 185.1 x 10.5 mm
    - Effective Viewing Area: 213.2 x 160.4 mm
    - Dot Pitch: 0.11 x 0.33 mm
    - 3.3V/5.0V supply

  (Please refer to datasheet for full specifications).

- 1 x Driver Card with VGA and DVI inputs
- CCFL Inverter and cables
- 32 Way KAB-FLEX32 cable
- 12V 1.25A Power supply
- Documentation CD

The documentation CD contains the manual for the parts that make up the kit.

WARNING: THE INVERTER SHOULD NEVER BE EXPOSED TO THE TOUCH WHILST THE SYSTEM IS POWERED, AS IT PRODUCES HIGH VOLTAGES AND IS A SHOCK HAZZARD.

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2 Setting up the kit

The kit should be unpacked in a static-free environment, with adequate anti-static precautions being observed.

The cables are all keyed and only one cable from the kit will fit each of the connection steps described below:

1) Connect the display to the inverter by connecting the pink and white cables protruding from the display to CN2 on the inverter.

2) Connect the other end of the inverter (CN1) to the driver card (CN101).

3) Connect the plug shaped end of the KAB-FLEX32 cable into the display and connect the other end to connector CN400 on the driver card.

4) Connect the OSD board to CN500 on the driver card.

5) Check the jumper settings on the driver card and confirm that they are correctly set according to the display and inverter requirements.

6) Ensure that the inverter is safely located, away from any metal objects and protected from being touched.

7) Supply a VGA source via CN2 (Analogue RGB) or CN1 (DVI).

8) Connect the 12V power supply to CN300 on the driver card and plug the 3-pin plug into the mains.

9) Switch the power button on/off on the OSD controller Board to switch the display on. However the correct input will have to be selected from the OSD menu. Refer to the driver card specifications for the OSD menu functionality.

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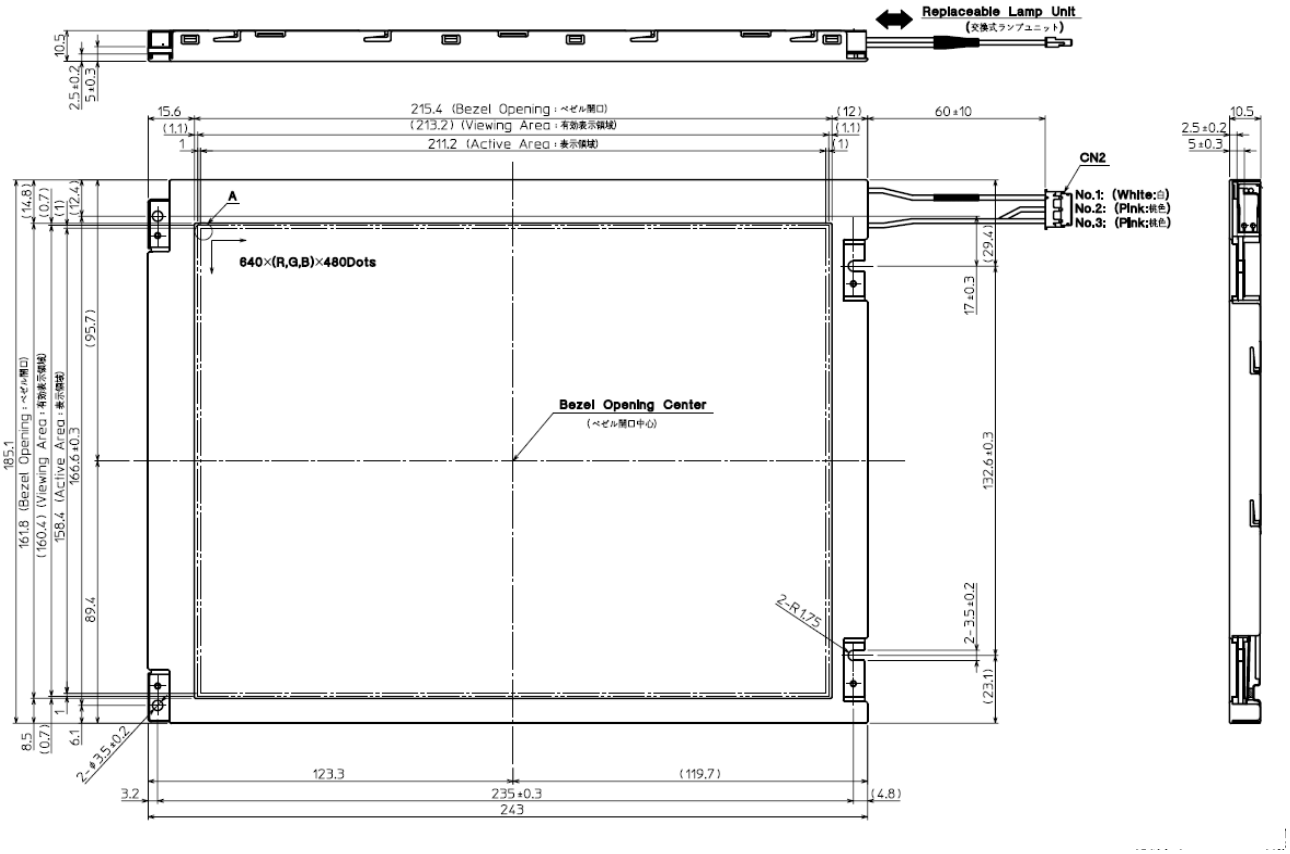
3 TFT PANEL

3.1 TFT mechanical parameters



Note (注記)

1 Connector (コネクター) CN1: DF9C-31P-1V(32) (HIROSE)
CN2: BHR-03VS-1 (JST)
2 Matching Connector (適合コネクター) CN1: DF9*-31S-1V (HIROSE)
DF9*-31S-1V(32) (HIROSE)
CN2: SM03(4.0)B-BHS-1-TB (JST)
SM03(4.0)B-BHS-1-TB-(LF)(SN) (JST)
3. The Information of LCD is displayed starting at the lower right hand corner, moving left then up to the upper left hand corner.
(LCDにおいて、画像データの表示は右下コーナーから始まり、左へ進み上へ送られ左上コーナーへ向かう。)
4 Tolerance without indication: ±0.5
(指示無き公差)

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3.2 Electrical parameters

3.2.1 Absolute maximum

Item	Symbol	Min.	Max.	Unit
Power input voltage	VDD	-0.3	6.0	V
Input signal voltage	Vin	-0.3	VDD + 0.3	V

3.2.2 Electrical Characteristics

Temp = 25℃

Item		Symbol	Min.	Typ.	Max.	Unit
Power supply voltage		VDD	3.0	3.3/5.0	5.25	V
Power supply current	White (a)	-	-	(495)	-	mA
	Black (b)	-	-	(450)	-	
	Vertical Stripe (C)	-	-	(563)	-	
Permissive input ripple voltage		VRP	-	-	100	mVp-p
Rush Current		IRUSH	-	-	(1)	A
Input signal voltage (Low)		VIL	-	-	0.3VDD	V
Input signal voltage (High)		VIH	0.7VDD	-	VDD	V

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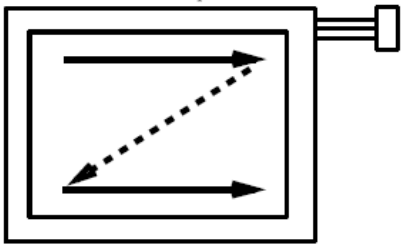
3.2.3 Interface Signals

PIN NO.	SYMBOL	DESCRIPTION	I/O	Note
1	GND	GND	–	
2	CK	Clock signal for sampling each data signal	I	
3	Hsync	Horizontal synchronous signal (negative)	I	
4	Vsync	Vertical synchronous signal (negative)	I	
5	GND	GND	–	
6	R0	RED data signal (LSB)	I	
7	R1	RED data signal	I	
8	R2	RED data signal	I	
9	R3	RED data signal	I	
10	R4	RED data signal	I	
11	R5	RED data signal (MSB)	I	
12	GND	GND	–	
13	G0	GREEN data signal (LSB)	I	
14	G1	GREEN data signal	I	
15	G2	GREEN data signal	I	
16	G3	GREEN data signal	I	
17	G4	GREEN data signal	I	
18	G5	GREEN data signal (MSB)	I	
19	GND	GND	–	
20	B0	BLUE data signal (LSB)	I	
21	B1	BLUE data signal	I	
22	B2	BLUE data signal	I	
23	B3	BLUE data signal	I	
24	B4	BLUE data signal	I	
25	B5	BLUE data signal (MSB)	I	
26	GND	GND	–	
27	DE	Signal to settle the horizontal display position(positive)	I	
28	VDD	power supply(+3.3V/+5.0V)	–	
29	VDD	power supply(+3.3V/+5.0V)	–	
30	NC	No connect	I	*1
31	SC	Scan direction control (GND or Open : normal, High : Reverse)	I	*2

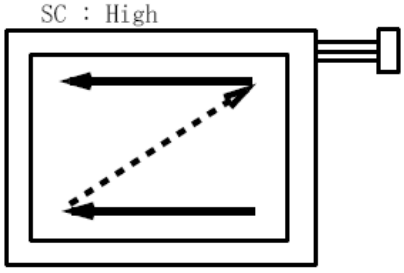
LCD side connector : DF9C-31P-1V(32) (HIROSE)
Recommended matching connector : DF9-31S-1V, DF9A-31S-1V(32) (HIROSE)
DF9B-31S-1V(32), DF9C-31S-1V(32) (HIROSE)

* The shield case is connected with GND.
*1 Do not input any signal at Pin No.30(Open state). It might happen LCD has a trouble.
*2 Scanning Direction

SC : GND or Open



SC : High



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3.2.4 CFL Backlight pin descriptions

Pin No.	Symbol	Description
1	COLD	Inverter output low voltage side
2	HOT	Inverter output high voltage side
3	HOT	Inverter output high voltage side

LCD side connector: BHR-03VS-1
Recommended matching connector: SM03-(4.0)B-BHS-1 (JST)
SM03-(4.0)B-BHS-1-TB(LF) (SN) (JST)

3.2.5 Backlight Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Starting discharge Voltage *1	VS	-	-	1,325	Vrms	-10
		-	-	830		25
Discharging tube current *2	IL	2.0	5.0	6.0	mArms	-
Discharging tube voltage	VL	-	490	-	Vrms	IL = 5.0 mArms
Operating frequency*3	F	40	-	100	kHz	-
Operating Life*4	T	36,000	50,000	-	hours	IL = 5.0 mArms

*1 The Non-load output voltage (VS) of the inverter should be designed to have some margin, because VS may increase due to the leak current which may be cause by wiring of CFL cables. (Reference value: (1,720) Vrms Min.)
*2 We recommend that you should set the discharging tube current at lower than typical value so as to prevent the heat accumulation of CFL tube from deteriorating the performance of the LCD.
*3 The driving frequency of the CFL may interfere with the horizontal synchronous signal, leaving interference of stripes on the display. So please evaluate LCD panels beforehand. To avoid interference stripes, we recommend to separate as far as possible the CFL frequency from the horizontal synchronous signal and its high harmonic frequency.
*4 End of life is defined as when the luminance or quality of light has decreased to 50% of the initial value. Luminance of light will drastically decrease when LCD is operated at lower temperature for long hours.
*There may be cases where interference noise on LCD PCB, generated by high-voltage products such as inverters, may leave stripes on the display. Please be careful when designing a mould to take into consideration that the inverter shall be located as far as possible from PCB. Shield protection may be effective.

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4 DRIVER CARD

Refer to datasheet for full specifications.

4.1 Electrical parameters

1.3	Connectors	
1.3.1	RGB analog input	CN2
1.3.2	OSD keypad connector	CN500 or CN501 ***Note1***
1.3.3	Backlight connector	CN101, CN102 ***Note1***
1.3.4	Serial Port connector	CN200
1.3.5	KAB-FLEX32 Interface	CN400 ***Note1***
1.3.6	KAB-JILI30-Interface	CN100 ***Note1***
1.3.7	DC Power supply	CN300
1.3.8	Flatpanel power supply configuration	JP102
1.3.9	Backlight control configuration	JP100, JP101
1.3.10	ADC Input connector	CN201
1.3.11	DVI input connector	CN1

Note1 can vary. Depends on version of CRTtoLCD-6

1.3.1	RGB Analog Input CN2		
High Density Sub-D-Connector 15 Contacts, Receptacle Case/Size : Right Angle, Through Hole			
	Name	**Pin**	**Description**
	RED	1	analog input red
	GREEN	2	analog input green
	BLUE	3	analog input blue
	NC	4	Not connected
	GND	5	Analog Ground
	GND	6	Analog Ground red
	GND	7	Analog Ground green
	GND	8	Analog Ground blue
	DDC+5V	9	Supply Voltage for DDC
	GND	10	Analog Ground
	NC	11	Not connected
	DDC_SDA	12	DDC serial data
	HSYNC	13	Horizontal sync input
	VSYNC	14	Vertical sync input
	DDC_SCL	15	DDC serial clock

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1.3.2	OSD Keypad Connector CN501					
14 Contacts IDC Connector, Gold plated, double row, vertical mount, through hole						
Description	**Name**	**Pin**		**Pin**	**Name**	**Description**
+5V Keypad Power out	VCC	1	O O	2	LED 2	LED Red ***Note1***
Keypad Button (Exit)	KEY	3	O O	4	KEY	Keypad Button (Menu)
Keypad Button (Right)	KEY	5	O O	6	KEY	Keypad Button (Left)
Transmit Data (TTL)	TXD	7	O O	8	RXD	Receive Data (TTL)
LED Green ***Note1***	LED 1	9	O O	10	KEY	Keypad Button (Power)
Not connected	NC	11	O O	12	Vcc12	+12V Power Keypad out
Power Ground	GND	13	O O	14	GND	Power Ground

Note1 Max. 4,5 mA output current

1.3.2	OSD keypad connector CN500		
	Connector: Molex 53261-1490 **Matching Connector: Molex 51021-1400** Connector Single Row, 14 contacts, Case/Size : Right Angle, 1,25mm Pitch		
	Name	**Pin**	**Description**
	LED2	1 O	LED Red ***Note1***
	LED1	2 O	LED Green ***Note1***
	GND	3 O	Key Power Ground
	KEY	4 O	Key Button(Power)
	GND	5 O	Key Power Ground
	KEY	6 O	Key Button(Menu)
	KEY	7 O	Key Button(Right)
	NC	8 O	Not Connected
	NC	9 O	Not Connected
	KEY	10 O	Key Button(Left)
	KEY	11 O	Key Button(Exit)
	KEY	12 O	Key Button(Autoadjust)
	GND	13 O	Power Ground
	VDD	14 O	+ 3.3 V Keypad Power out
	Key Active = Button connected to Power Ground		

Note1 Max. 4,5 mA output current

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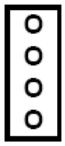
1.3.3	**Backlight Connector CN102** **Connector: Molex 53261-0790** **Matching Connector: Molex 51021-0700**		
Connector Single Row, 7 Contacts, Case/Size : Right Angle, 1,25mm Pitch			
	Pin	**Name**	**Description**
	1	NC	Not connected
	2	BKLTADJ	analog 0V to +5V or 0V to +12V (refer JP101)
	3	GND	Power Ground
	4	Backlight power supply	Typ. +12V (Note same as DC Input Voltage , 1 Ampere per contact allowed)
	5	Backlight power supply	
	6	GND	Power Ground
	7	BLON	Backlight control signal (TTL, refer to JP100) Polarity settings

1.3.3	**Backlight Connector CN101**		
Connector: Molex 53261-1090 **Matching Connector: Molex 51021-1000** Connector Single Row, 10 Contacts, Case/Size : Right Angle, 1,25mm Pitch			
	Pin	**Name**	**Description**
	1	BLON	Backlight control signal (TTL, refer to JP100)
	2	GND	Power Ground
	3	GND	Power Ground
	4	Backlight power supply	Typical. +12V (Note same as DC Input Voltage , 1 Ampere per contact allowed)
	5	Backlight power supply	
	6	Backlight power supply	
	7	Backlight power supply	
	8	GND	Power Ground
	9	GND	Power Ground
	10	BKLTADJ	analog 0V to +5V or 0V to +12V (refer to JP101)

1.3.4	**Serial Port connector CN200** The OSD (On Screen Display) can be controlled either trough the keypad or the serial connector CN500/501 for configuration purposes or mass production. See also chapter 1.8 for detailed description. **Caution !** The transmit and receive signals have TTL level!		
Connector: Molex 53261-0490 Matching Connector: Molex 52021-0400			
	Pin	**Name**	**Description**
	1	VCC	+5V DC Power (output)
	2	RXD	Receive Data Signal
	3	TXD	Transmit Data Signal
	4	GND	Power Ground

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1.3.5	**KAB-FLEX32-Interface CN400** This connector directly matches through an interface cable for 31/41 pin VGA/SVGA TFT interface. All flat screen signals are LVTTL compatible (3.3V)

Flatfoil Connector 32 Contacts, Right Angle, Bottom Contact
Case/Size : 0,5mm Pitch, ZIF

Description	Name	Pin	Pin	Name	Description
Power Ground	GND	1	2	SCLK	Data clock
Latch pulse	LP	3	4	FLM	First Line Marker
Power Ground	GND	5	6	P0	Panel Data R0
Panel Data RED1	P1	7	8	P2	Panel Data RED2
Panel Data RED3	P3	9	10	P4	Panel Data RED4
Panel Data RED5	P5	11	12	GND	Power Ground
Panel Data GREEN0	P6	13	14	P7	Panel Data GREEN1
Panel Data GREEN2	P8	15	16	P9	Panel Data GREEN3
Panel Data GREEN4	P10	17	18	P11	Panel Data GREEN5
Power Ground	GND	19	20	P12	Panel Data BLUE0
Panel Data BLUE1	P13	21	22	P14	Panel Data BLUE2
Panel Data BLUE3	P15	23	24	P16	Panel Data BLUE4
Panel Data BLUE5	P17	25	26	GND	Power Ground
Data Enable	MOD (DE)	27	28	Panel_VCC	Panel Power ***Note1***
Panel Power ***Note1***	Panel_VCC	29	30	R/L	Right/Left
Up/Down rotate	U/D	31	32	NC	Not connected

Note1: Refer to JP102 how to configure the panel power

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1.3.6	KAB-JILI30-Interface CN100		
	Connector: JAE FI-X30S-HF Matching Connector: JAE FI-X30H		
	Name	**Pin**	**Description**
	FTX0-	1	Even Receiver Signal
	FTX0+	2	Even Receiver Signal
	FTX1-	3	Even Receiver Signal
	FTX1+	4	Even Receiver Signal
	FTX2-	5	Even Receiver Signal
	FTX2+	6	Even Receiver Signal
	GND	7	Power Ground
	FTXC-	8	Even Clock Signal
	FTXC+	9	Even Clock Signal
	FTX3-	10	Even Receiver Signal
	FTX3+	11	Even Receiver Signal
	STX0-	12	Odd Receiver Signal
	STX0+	13	Odd Receiver Signal
	GND	14	Power Ground
	STX1-	15	Odd Receiver Signal
	STX1+	16	Odd Receiver Signal
	GND	17	Power Ground
	STX2-	18	Odd Receiver Signal
	STX2+	19	Odd Receiver Signal
	STXC-	20	Odd Clock Signal
	STXC+	21	Odd Clock Signal
	STX3-	22	Odd Receiver Signal
	STX3+	23	Odd Receiver Signal
	GND	24	Power Ground
	NC	25	Not Connected
	PPWR	26	Controls Panel Digital Power
	NC	27	Not Connected
	PANEL_VCC	28	Panel Power (refer to JP102)
	PANEL_VCC	29	Panel Power (refer to JP102)
	PANEL_VCC	30	Panel Power (refer to JP102)

1.3.7	DC Power Supply CN300 Apply operating voltage using connector CN300 or CN301.		
	4 Contact Connector, Single Row, Right Angle, Polarization, through hole		
	Pin	**Name**	**Description**
	1	NC	Not connected
	2	GND	Power Ground
	3	GND	Power Ground
	4	+12V	+12 V DC Power Input

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1.3.8	Flatpanel Power Configuration JP102				
	Short pins 1-2 or 2-3 or leave open to choose required voltage supply. **Caution !** Only one configuration for flatpanel is allowed, otherwise the board is permanently damaged.				
	Connector Single Row 2,54 mm, 3 Contacts, Gold plated Case/Size : Vertical, Through Hole				
	1 2 3 Pin	**2-3**	**1-2**	**open**	**Delivery Default**
	O O O	+12V	+5V	+3.3V	**1-2 closed**
		Never unplug/replug while in use!			

1.3.9	Backlight Control Configuration JP100		
	Use JP100 to control polarity of backlight control signal.		
	Connector Single Row 2,54 mm, 3 Contacts, Gold plated Case/Size : Vertical, Through Hole		
	1 2 3 Pin	**2-3**	**1-2**	**Delivery Default**
	O O O	/BLON	BLON	**1-2 closed**
		Never unplug/replug while in use!		

1.3.9	Backlight Output Adjust Configuration JP101		
	Use JP101 to set correct backlight adjust range I-out 20mA max.		
	Connector Single Row 2,54 mm, 3 Contacts, Gold plated Case/Size : Vertical, Through Hole		
	1 2 3 Pin	**2-3**	**1-2**	**Delivery Default**
	O O O	Typ. 0-12V	Typ. 0-5V	**1-2 closed**
		Never unplug/replug while in use!		

1.3.10	ADC Input Connector CN201 (Light Sensor Input)		
	Connector: Molex 53261-0590 Matching Connector: Molex 52021-0500		
	Pin	**Name**	**Description**
	1	GND	Power Ground
	2	ADC1	ADC1 Input ***Note1**
	3	DVDD3.3	3.3V output source (max.50mA)
	4	ADC2	ADC2 Input ***Note1**
	5	GND	Power Ground

Note1 Input range is 0 - 3V. Onboard pulled up to DVDD3.3 through 4, 7 KΩ resistor.

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1.3.11 DVI-D Input Connector CN1 (optional)

This input supports the connection of DVI capable video cards and supports resolutions from 640x480 up to 1600x1200.

Connector 24 Contacts, Gold plated
Case/Size : Vertical, Through Hole

Description	Name	Pin		Pin	Name	Description
Receiver Signal(-) (RX2-)	RX2-	1	O O	2	RX2+	Receiver Signal(+) (RX2+)
Power Ground	GND	3	O O	4	NC	Not connected
Not connected	NC	5	O O	6	SCL	I^2C clock
I^2C Data	SDA	7	O O	8	NC	Not connected
Receiver Signal(-) (RX1-)	RX1-	9	O O	10	RX1+	Receiver Signal(+) (RX1+)
Power Ground	GND	11	O O	12	NC	Not connected
Not connected	NC	13	O O	14	+5V	+5V from DVI video card
Power Ground	GND	15	O O	16	HP	Hot Plug
Receiver Signal(-) (RX0-)	RX0-	17	O O	18	RX0+	Receiver Signal(+) (RX0+)
Power Ground	GND	19	O O	20	NC	Not connected
Not connected	NC	21	O O	22	GND	Power Ground
Clock Signal(+) (RXC+)	RXC+	23	O O	24	RXC-	Clock Signal(-) (RXC-)
Not connected	NC	C1	O O	C2	NC	Not connected
Not connected	NC	C3	O O	C4	NC	Not connected
Not connected	NC	C5	O O	C5-1	NC	Not connected

1.4 On Screen Display

With the OSD (On Screen Display) you can modify the settings and control the special features of the CRTtoLCD-6. The OSD uses a number of menus for making changes and turning the special features on or off. The configuration can be done via the OSD-keypad (OSD-Panel-Kit).
To start the OSD press the "OSD" button on the keypad, after switching the power supply on. If a valid flat panel configuration is installed, the OSD Main Menu will be displayed.

To select an tab, simply use the button "UP" or "DOWN" to move the cursor to the tab you want and press button "OSD". When you use the tab "Exit" and press the "CONFIRM"-button, the OSD will be closed.
To use a tab menu, simply use "OSD"-button to select the field.
Use "UP" or "DOWN" to select a value for that field. The "Exit"-field on the bottom-side on the tab will go up to the tab-selection. Simply press the "OSD"-button.

Note: All changed values will only be saved by selecting "Exit" from the OSD. If not, the adjusted values will be lost after loss of power.

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Input Select

Feature	Button	Description
Select VGA	Press “OSD”	Select VGA input
Select DVI	Press “OSD”	Select DVI input
Exit	Press “OSD”	Exit menu

Brightness

Feature	Button	Description
Brightness	Press “OSD” to enter Adjust with “Up” and “Down”	Adjust brightness
Contrast	Press “OSD” to enter Adjust with “Up” and “Down”	Adjust contrast
Backlight Brightness	Press “OSD” to enter Adjust with “Up” and “Down”	Adjust backlight brightness
Backlight Mode	Use “Up” and “Down”	Enter Backlight Mode submenu
- Manual Backlight	Use “Up” and “Down”	Control backlight over the OSD
- External Backlight Control	Use “Up” and “Down”	Enable external control of backlight
- Exit		Exit submenu
Exit	Press “OSD”	Exit menu

Color Settings

Feature	Button	Description
Auto Color Adjust	Press “OSD”	Adjust colors automatically
Switch sRGB Mode	Press “OSD”	Switch to sRGB mode
Color Temperature	Press “OSD”	Enter Color Temperature submenu
- Select Color Temperature	Press “OSD”	Select predefined color temperatures
- Adjust RGB Values	Press “OSD”	Enter Adjust RGB Values submenu
- Red Color Value	Use “Up” and “Down”	User defined value of color temperature
- Green Color Value	Use “Up” and “Down”	User defined value of color temperature
- Blue Color Value	Use “Up” and “Down”	User defined value of color temperature
- 4200K	Press “OSD”	Set predefined color temperature of 4200K
- 5000K	Press “OSD”	Set predefined color temperature of 5000K
- 6500K	Press “OSD”	Set predefined color temperature of 6500K
- 7500K	Press “OSD”	Set predefined color temperature of 7500K
- 9300K	Press “OSD”	Set predefined color temperature of 9300K
- Exit	Press “OSD”	Exit submenu
Exit	Press “OSD”	Exit menu

Image Settings

Feature	Button	Description
Auto Adjust	Press “OSD”	Adjust image automatically
Adjust Width	Press “OSD” to enter Adjust with “Up” and “Down”	Adjust image width
Adjust Phase	Press “OSD” to enter Adjust with “Up” and “Down”	Adjust image phase
Horizontal Pos	Press “OSD” to enter Adjust with	Adjust image horizontal position

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	"Up" and "Down"	
Vertical Pos	Press "OSD" to enter Adjust with "Up" and "Down"	Adjust image vertical position
Exit	Press "OSD"	Exit menu

Tools

Feature	Button	Description
OSD Settings	Press "OSD"	Enter OSD Settings submenu
- OSD Timeout	Use "Up" and "Down"	Set the OSD time to close automatically
- OSD Hor. Position	Use "Up" and "Down"	Set OSD horizontal position
- OSD Ver. Position	Use "Up" and "Down"	Set OSD vertical position
- OSD Orientation	Press "OSD"	Enter OSD Orientation submenu
- Standard	Press "OSD"	OSD standard orientation
- Rotate 90	Press "OSD"	Set OSD orientation at 90 degrees
- Rotate 180	Press "OSD"	Set OSD orientation at 180 degrees
- Rotate 270	Press "OSD"	Set OSD orientation at 270 degrees
- Horizontal Mirror	Press "OSD"	View the OSD horizontally mirrored
- Exit		Exit submenu
Factory Reset	Press "OSD"	Recall all default factory settings
Factory Color Reset	Press "OSD"	Recall the factory default color settings
Factory Position Reset	Press "OSD"	Recall the factory default position of screen
Sharpness	Use "Up" and "Down"	Adjust level of sharpness
Overlapped Mode Select	Press "OSD"	Select overlapped mode
Exit	Press "OSD"	Exit menu

Exit OSD Menu

Feature	Button	Description
Exit	Press "OSD"	Exit the OSD and save changes

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1.5 Technical Specification

These values were measured with OSD-Panel attached and without flatpanel and backlight inverter.

- Supply voltage at 25°C without load:

Minimum supply voltage	:	+ 11,4 V DC
Typical supply voltage	:	+ 12,0 V DC
Absolute Maximum supply voltage	:	+ 12.6 V DC

- Typical Input current at 25°C without load:

CRTtoLCD-6 with input signal (XGA)	:	200 mA
CRTtoLCD-6 with power down typical	:	tbd mA

- Input Supply voltage ripple : typical 100 mV peak to peak 0 – 20 MHz

- Current Rating of Flatpanel Power supply:

PANEL VCC	Steady State 3V / 5V and 12V @ +-5% : 3A
PANEL VCC	5sec. -5% 3V3 @4,22A
PANEL VCC	5sec. -5% 5V @ 4,15A
PANEL VCC	5sec. -2% 12V @ 3,73 A

Note: Output power without any switch or short circuit breaker

- Slewrate of Flatpanel Power supply with 3A load

PANEL VCC 3V3	385us
PANEL VCC 5V	481us
PANEL VCC 12V	1.7ms

- Voltage and Current Rating of Backlight Power supply:

Direct +12V Output voltage without any switch or short circuit breaker
CN400: Maximum output current 4A
CN401: Maximum output current 2A
There are no limitations between Backlight Power and Flatpanel Power
The only limitation is the capability of the DC Input Power supply

VGA connector signals :		
Sync input voltage low	:	0.8 V
Sync input voltage high	:	2.4 V
RGB input voltage	:	0 – 0.7 V with 75 Ohm external termination
RGB input current	:	0 – 5 mA

- Temperature : ambient : 0° C – 60° C (*1)
Non operating : - 10° C – 85° C

(*1) The maximum temperature on the module surface can exceed above mentioned ambient temperature. It is the user responsibility to keep this temperature within the above specification.

- Thermal gradient : operating : 25° C per hour
non-operating : 40° C per hour

- Relative Humidity : operating : 10% - 90 % RH non-condensing
non operating : 5% - 95% RH non-condensing

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1.5	Technical Specification

- Mechanical : Shock : 50G/20ms square wave maximum
Vibration : 1G/0-600Hz, dwell not to exceed

- Altitude : operating : 0 – 3000 m
non-operating : 0 – 5000 m

- Dimensions of the printed circuit board :

Width	:	88.9 mm
Length	:	101.6 mm
Thickness	:	1.50 mm

- Dimensions of the module :

Width	:	95.00 mm
Length	:	118,60 mm
Height	:	16.50 mm +2mm (*)

Note : The dimension of the module can change if cable, Adapter or Keypad plugged in!

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1.6	Supported Video Modes (Analog Input)	
	Generally all VESA compatible video modes are supported. If modes are not supported the controller displays “Invalid Mode” on the flat panel. In this case use the KCWB (**K**ontron **C**onfiguration **W**ork**B**ench), available on the a.m. website, to add this special mode to the supported mode table. **Following modes are tested**	
Video Mode Input	Vertical refresh rate	Mode standard
720 x 400	70 Hz	DOS
640 x 350	70 Hz	DOS
640 x 400	70 Hz	DOS
640 x 480	59,9 Hz	VGA
640 x 480	60 Hz	VGA
640 x 480	72 Hz	VGA
640 x 480	72,8 Hz	VGA
640 x 480	75 Hz	VGA
800 x 600	56,25 Hz	SVGA
800 x 600	60 Hz	SVGA
800 x 600	70 Hz	SVGA
800 x 600	72 Hz	SVGA
800 x 600	75 Hz	SVGA
1024 x 768	60 Hz	XGA
1024 x 768	70 Hz	XGA
1024 x 768	72 Hz	XGA
1024 x 768	75 Hz	XGA
1152 x 864	60 Hz	
1152 x 864	70 Hz	
1152 x 864	75 Hz	
1280 x 1024	60 Hz	SXGA
1280 x 1024	70 Hz	SXGA
1280 x 1024	75 Hz	SXGA
1600 x 1200	60 Hz	UXGA

1.6	Supported Video Modes (DVI Input)	
	Generally all VESA compatible video modes are supported. If modes are not supported the controller displays “Invalid Mode” on the flat panel. In this case use the KCWB (**K**ontron **C**onfiguration **W**ork**B**ench), available on the a.m. website, to add this special mode to the supported mode table. **Following modes are tested**	
Video Mode Input	Vertical refresh rate	Mode standard
640 x 480	60 Hz	VGA
800 x 600	60 Hz	SVGA
1024 x 768	60 Hz	XGA
1280 x 1024	60 Hz	SXGA

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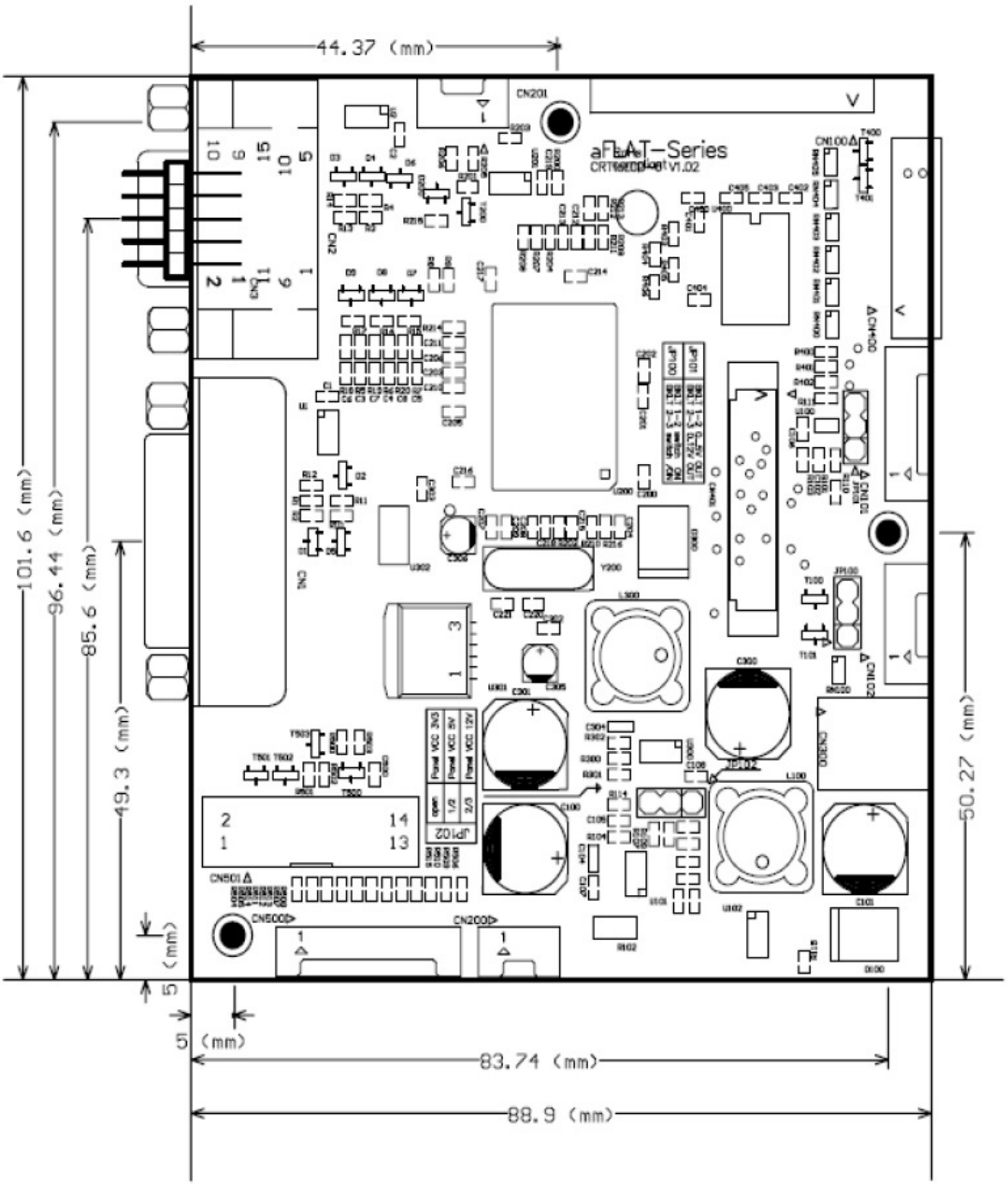
4.2 Mechanical parameters

1.7	Layout/Schematics



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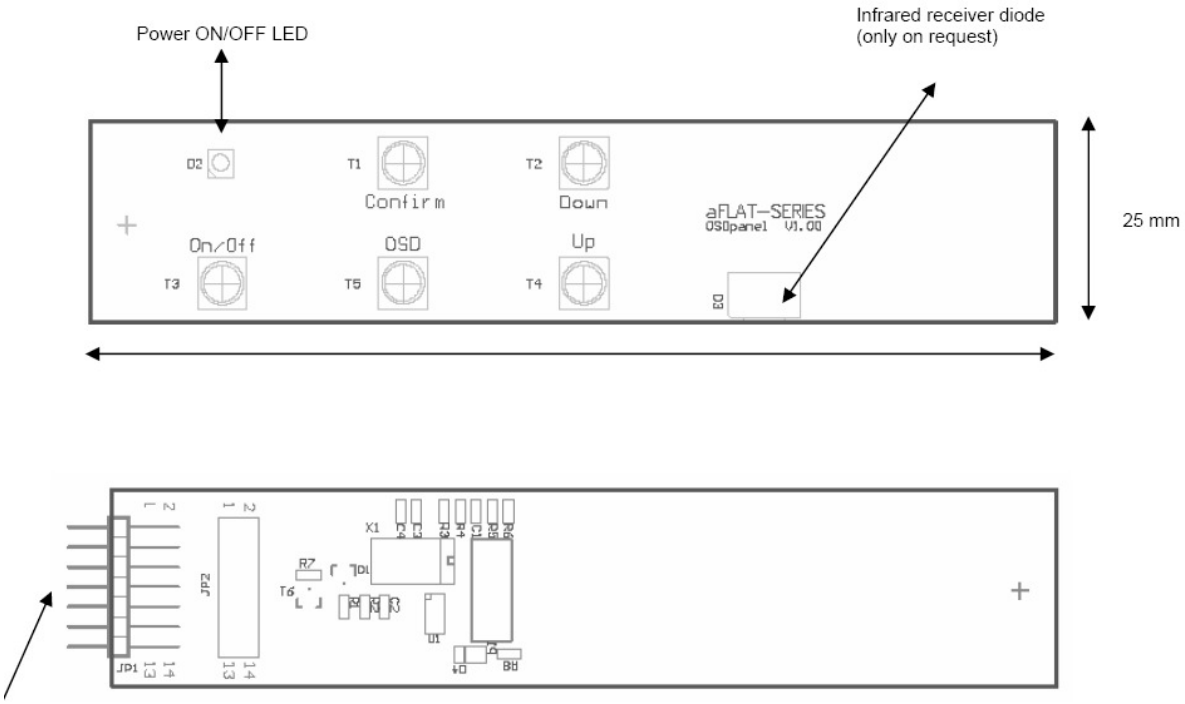
OSD-Keypad “OSD-Panel“



ypad JP1 connected to CN501 of CRTtoLCD-6!

5 Technical support

For technical support, please contact us at sales@densitron.co.uk or visit our website: www.densitron.co.uk.

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